Template Week 5 – Operating Systems

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Assignment 5.1: Unix-like:

a) Find out what the difference is between UNIX and unix-like operating systems?

UNIX is a trademarked operating system originally developed by Bell Labs in the 1970s. It follows a set of specific standards defined by POSIX and must be certified to be called "UNIX."

UNIX-like و These are operating systems that behave similarly to UNIX but are not officially certified as UNIX. They include free and open-source systems like Linux, BSD, and others, which adopt UNIX principles but have different origins or licensing models.

b) Study the image above named UNIX timeline. Find out who Ken Thompson, Dennis Ritchie, Bill Joy, Richard Stallman, and Linus Torvalds are and what they have contributed to the development of UNIX or unix-like systems and to IT in general. **TIP!** English-language sources often contain more detailed information about these individuals.

Ken Thompson:

1- **Co-creator of UNIX along with Dennis Ritchie at Bell Labs in the early 1970s.**
2- **Developed the B programming language, which influenced the creation of C.**

Dennis Ritchie:

1- **Co-creator of UNIX and the inventor of the C programming language.**
2- **C became the foundation for many operating systems, including UNIX and Linux.**

Bill Joy:

1- **Co-creator of BSD (Berkeley Software Distribution), a variant of UNIX.**
2- **Known for developing tools like the vi-text editor and playing a major role in the early development of the internet.**

Richard Stallman:

1- **Founder of the Free Software Foundation (FSF) and the GNU Project.**
2- **Advocated for free and open-source software, contributing to the development of GNU utilities that form the basis of many Linux distributions.**

Linus Torvalds:

1- **Creator of the Linux kernel in 1991.**

2- **His work laid the foundation for the Linux operating system, which is widely used in servers, desktops, and embedded systems.**

c) What is the philosophy of the GNU movement?

The GNU movement, led by Richard Stallman, promotes the idea that software should respect users' freedom. Its key principles include:

1- **The freedom to run the program as you wish.**

2- **The freedom to study how the program works and change it.**

3- **The freedom to redistribute copies.**

4- **The freedom to distribute modified versions. The goal is to ensure software is free for everyone to use, modify, and share, promoting user autonomy and avoiding vendor lock-in.**

d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.

Partially: Ubuntu, based on Linux, includes GNU tools and promotes free software. It follows many principles of the GNU philosophy by providing an open-source operating system.

However, Ubuntu also includes proprietary software and drivers (like graphics drivers and codecs) to improve user experience. This decision aligns with usability and hardware support but diverges slightly from the strict philosophy of GNU, which advocates for completely free software.

e) Find out what is the Windows Subsystem for Linux?

WSL is a compatibility layer developed by Microsoft that allows Linux binaries to run natively on Windows. It enables users to use Linux command-line tools and run Linux applications without needing a virtual machine or dual-booting.

It is primarily used by developers to access Linux utilities (like bash, grep, or awk) directly from a Windows environment.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?

1- **Android: Belongs to the Linux family, as it is built on a modified version of the Linux kernel.**

2- **iOS: Belongs to the BSD/UNIX family because it is based on Darwin, which derives from FreeBSD.**

3- **ChromeOS: Belongs to the Linux family, as it is built on the Linux kernel with additional layers for Chrome-based functionality.**

Assignment 5.2: Supercomputers and gameconsoles:

a) Research on this site what supercomputers are used for and write a short summary of it: https://www.computerhistory.org/timeline/search/?q=Supercomputer

+ Supercomputers are extremely powerful computers designed to perform complex calculations at high speeds. They tackle tasks that are too demanding for regular computers, such as:

- **Weather Forecasting:** Predicting weather patterns by processing vast amounts of atmospheric data.
- **Scientific Research:** Simulating physical and biological processes, like the evolution of the universe or molecular interactions in drug development.
- **Cryptography:** Decoding encrypted information for security purposes.
- **Engineering Design:** Assisting in the creation of aircraft and other complex systems through detailed simulations.

Historically, supercomputers have been instrumental in advancing various fields by providing the computational power necessary to solve intricate problems.

b) IBM is a company that has already built a number of supercomputers. One of them is IBM's Roadrunner. The CPU developed for this supercomputer was further developed at a later stage as the CPU for the PlayStation 3 console. Find out what a **PlayStation 3 cluster** is and what it was used for?

+ A PlayStation 3 (PS3) cluster is a group of PS3 gaming consoles connected to work together as a single, powerful computer system. This setup leverages the PS3's **Cell processor**, which was originally developed by IBM for supercomputing tasks and later adapted for the gaming console.

By linking multiple PS3 units, researchers and organizations have created cost-effective supercomputers capable of handling complex computations. Notable examples include:

1- **U.S. Air Force's Condor Cluster:** Comprising 1,760 PS3 consoles, this cluster was used for processing high-resolution satellite imagery and research in artificial intelligence.

2- **University of Massachusetts Dartmouth's PS3 Gravity Grid:** Utilizing 16 PS3 consoles, this cluster performed astrophysical simulations, such as modeling the behavior of black holes.

These PS3 clusters provided a budget-friendly alternative to traditional supercomputers, making advanced computing more accessible for various scientific and military applications.

c) You can build a supercomputer by putting a few computers together in a cluster. Here's what Oracle did with a collection of Raspberry Pi's, for example: https://blogs.oracle.com/developers/post/building-the-worlds-largest-raspberry-pi-cluster What specific operating system is running on this cluster?

+ Oracle's Raspberry Pi cluster operates on **Oracle Linux 7.7**, with each Raspberry Pi network-booting this operating system and utilizing an in-memory file system.

d) Does Oracle's Raspberry Pi supercomputer appear in the list of the 500 fastest supercomputers in the world? Make a logical decision for this, without going through the entire list. https://www.top500.org/lists/top500/list/2023/06/

+ Considering the hardware limitations of Raspberry Pi devices, it's highly unlikely that Oracle's Raspberry Pi supercomputer ranks among the world's 500 fastest supercomputers. **The TOP500 list** features systems with significantly higher performance capabilities than what a Raspberry Pi cluster can achieve.

e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?
What operating systems run on these consoles?
What conclusion can you draw from the answer to the previous question?

+ Both the PlayStation 5 and Xbox Series X utilize custom AMD Zen 2 CPUs. The PlayStation 5 runs a custom operating system based on FreeBSD, while the Xbox Series X operates on a version of Windows. This indicates that despite sharing similar hardware architectures, the consoles employ distinct operating systems tailored to their respective platforms.

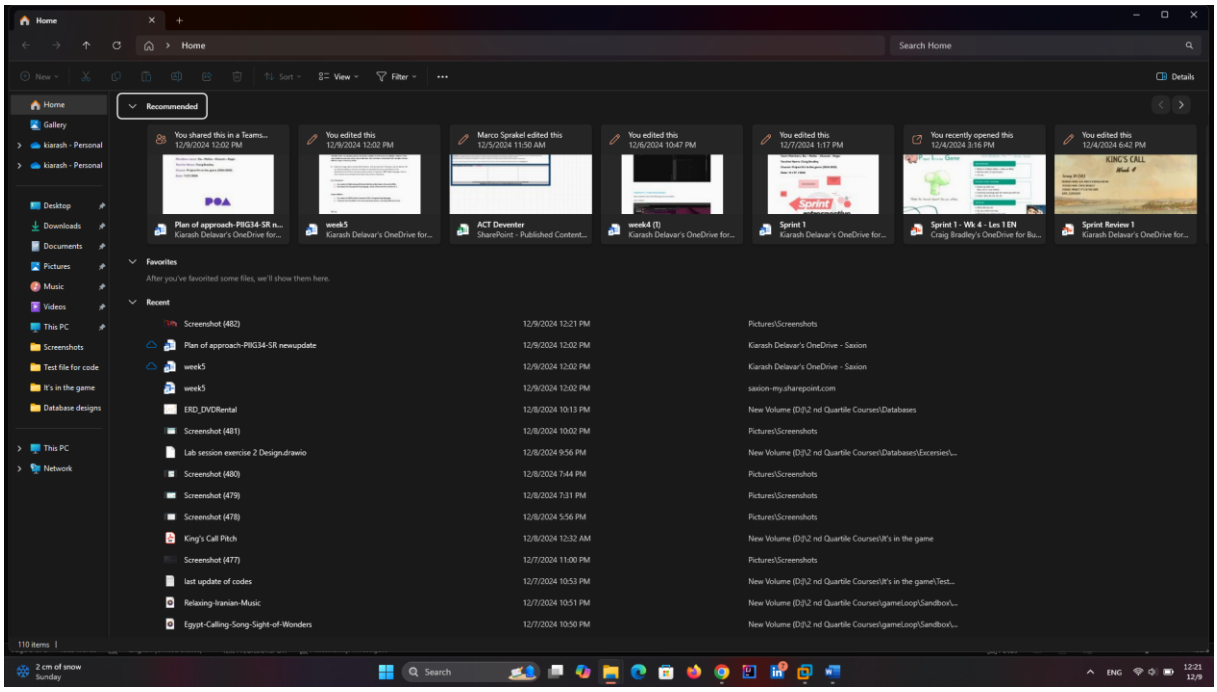
Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

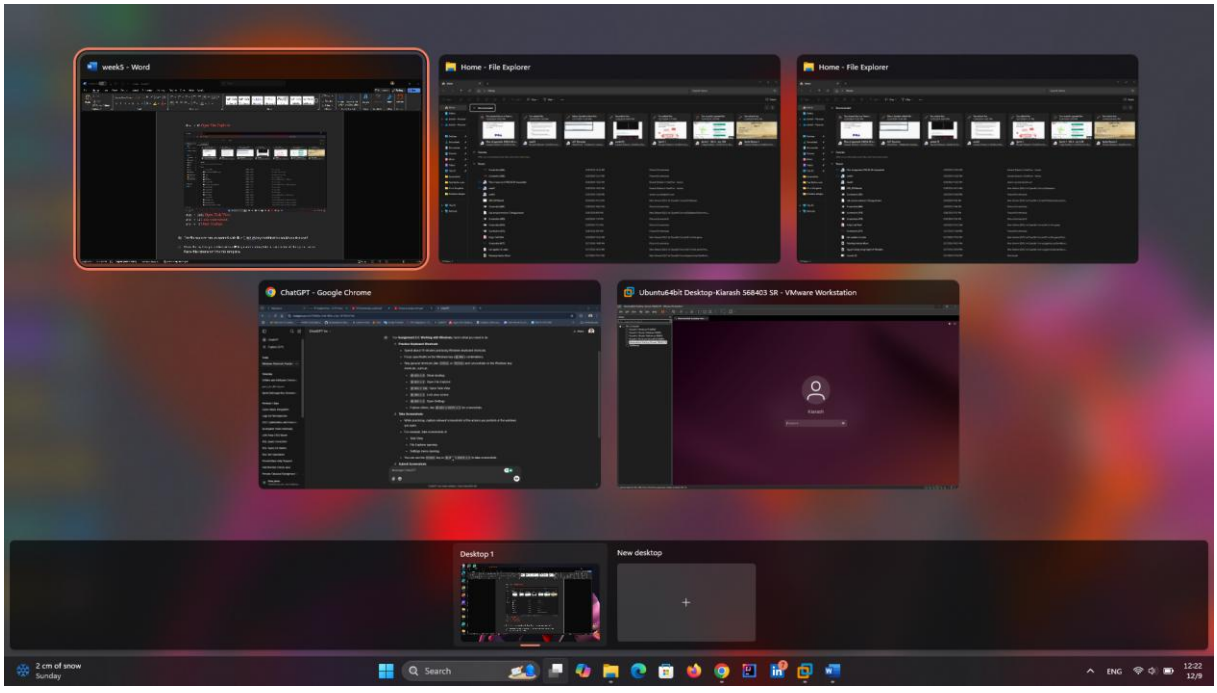
a) Practice for about 10 minutes with the ⊞ keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.

`Win + D`: Show desktop:

`Win + E`: Open File Explorer:

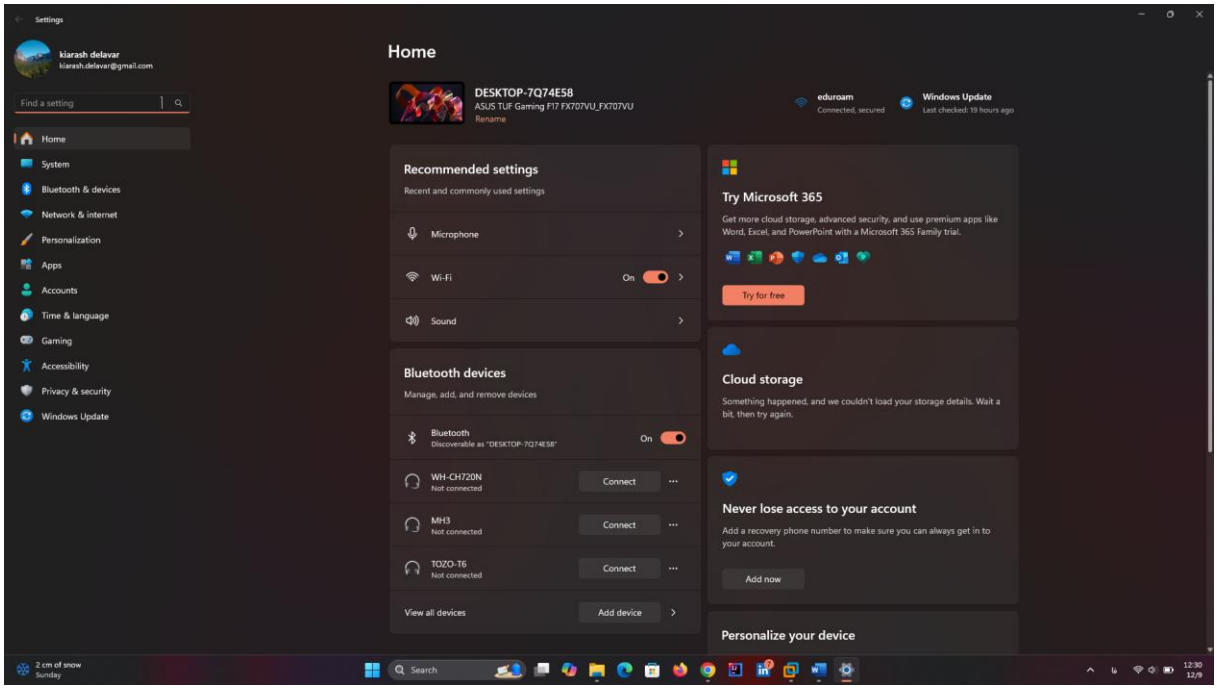


`Win + Tab`: Open Task View:



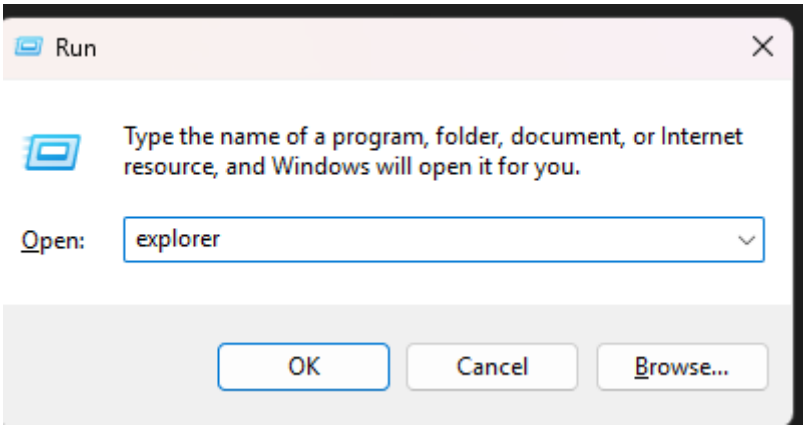
`Win + L`: Lock your screen:

`Win + I`: Open Settings:



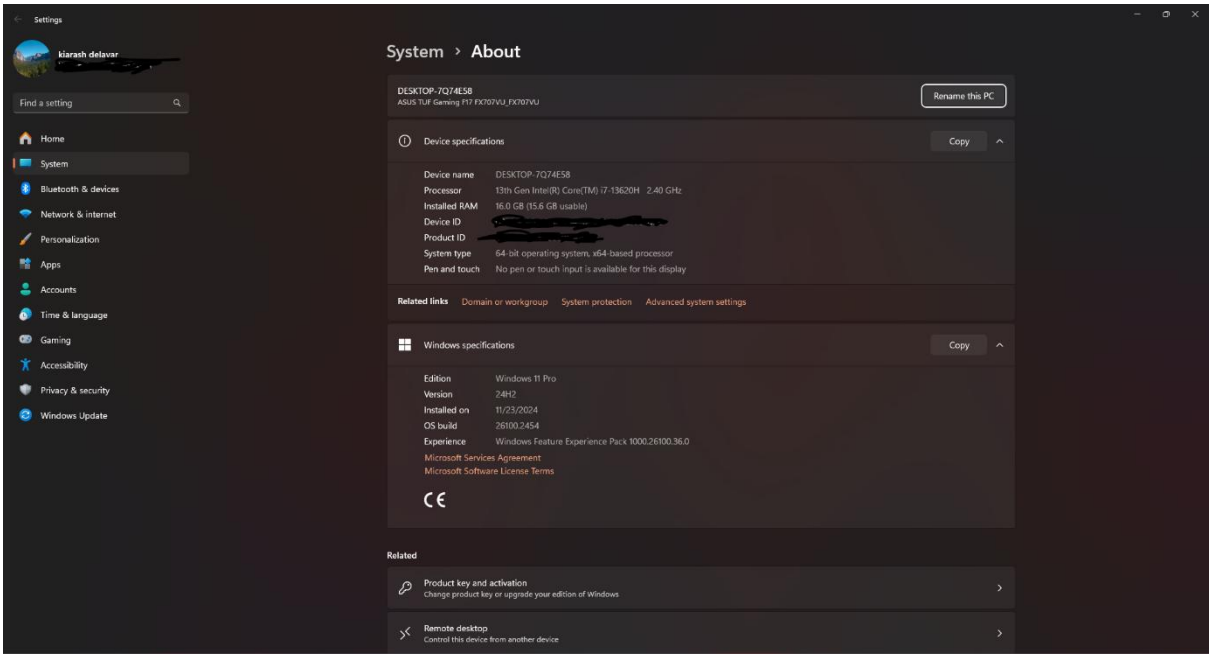
b) The file explorer can be opened with ⊞ + E, Which key combination could you also use?

Win + R: I can use this command for file explorer and then I have to type “explorer” to see that.



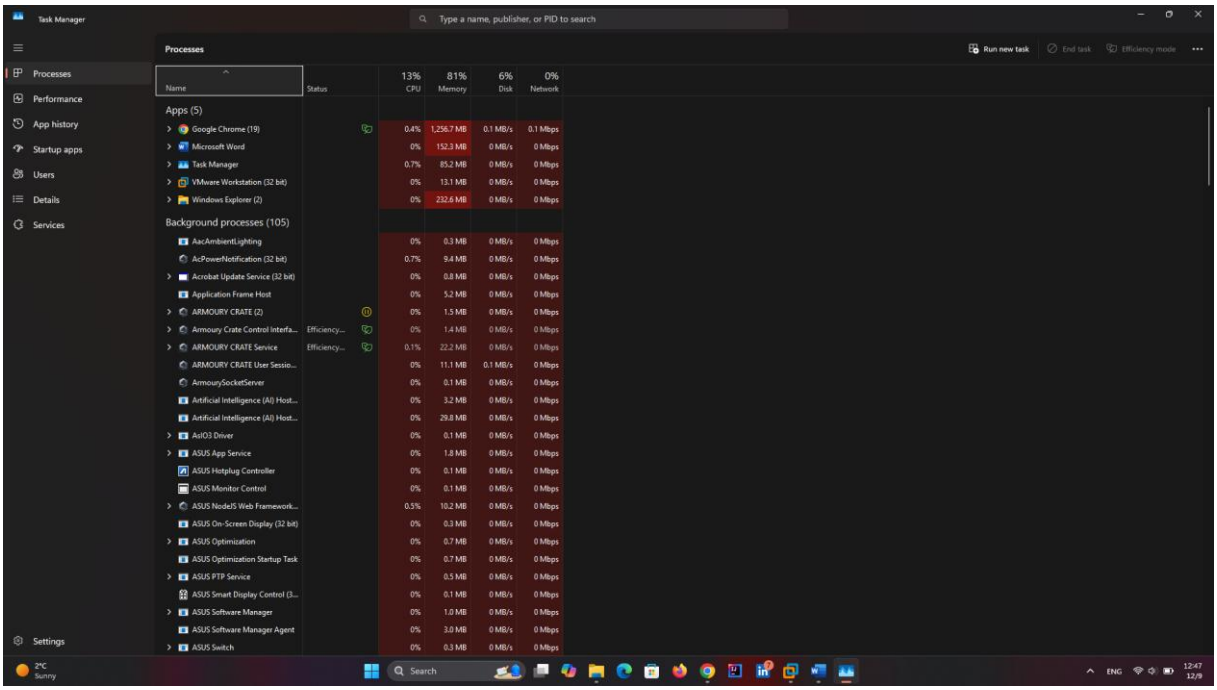
c) Open the system properties with a ⊞ key combination, take a screenshot of the open screen. Paste this screenshot into this template.

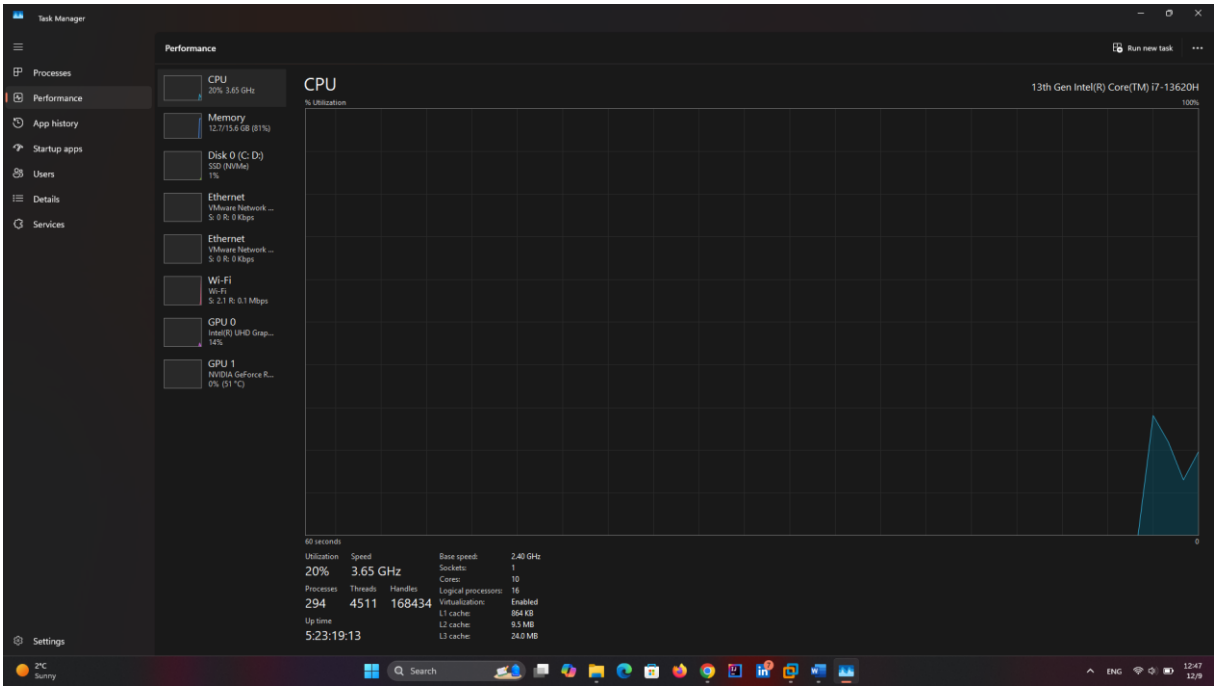
Win + Pause/Break:



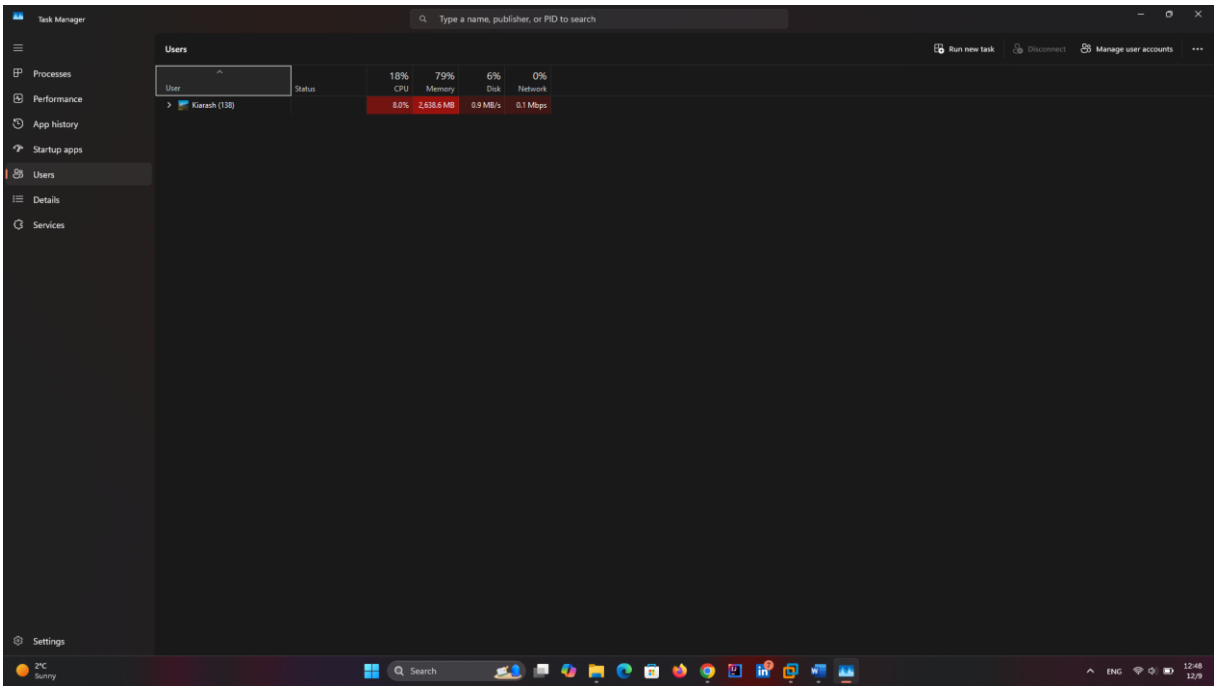
d) Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.

Ctrl + Shift + Esc:

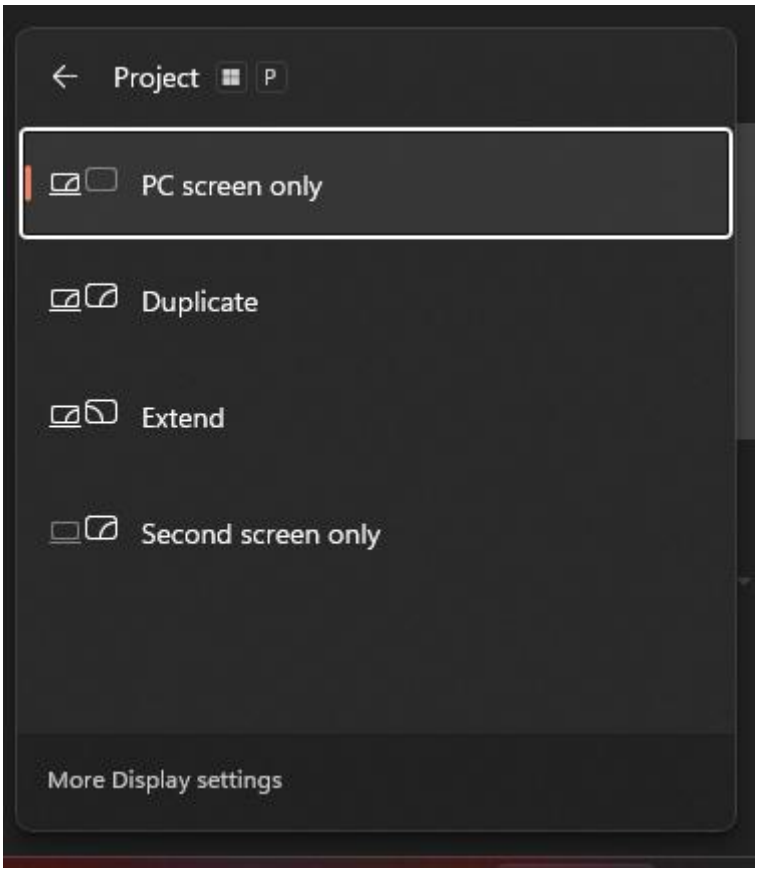




Users:



e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector, or the second screen. Which key combination should you use for this?



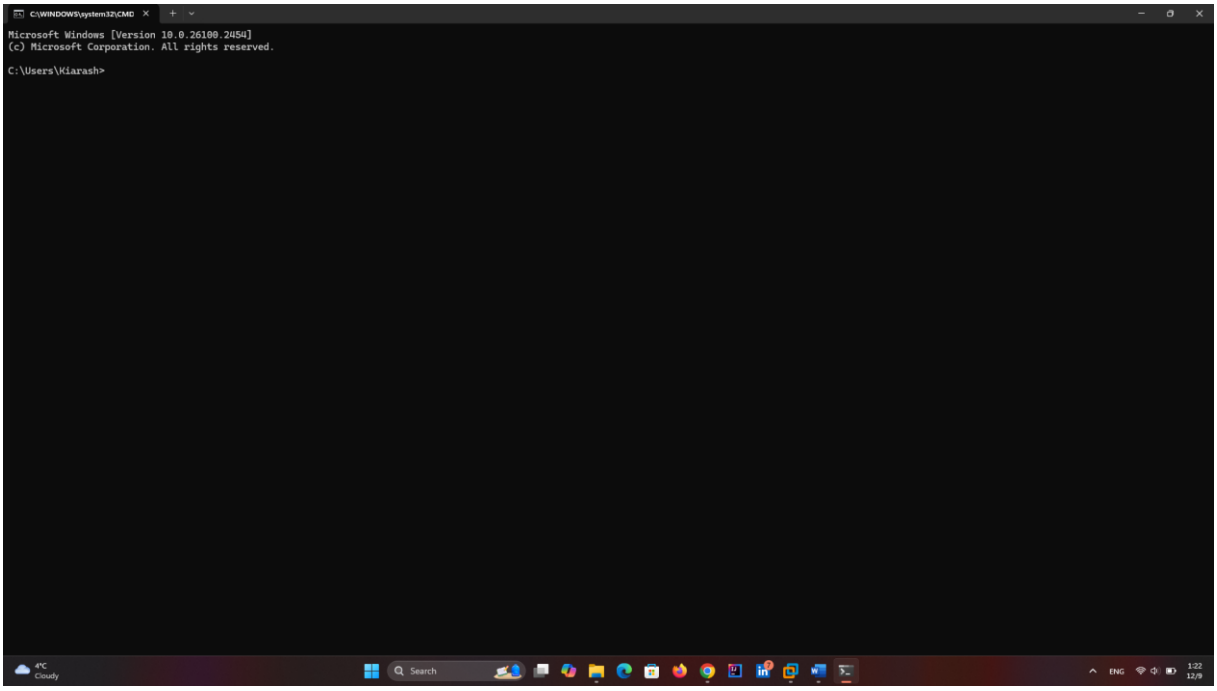
I used " win + P " for that.

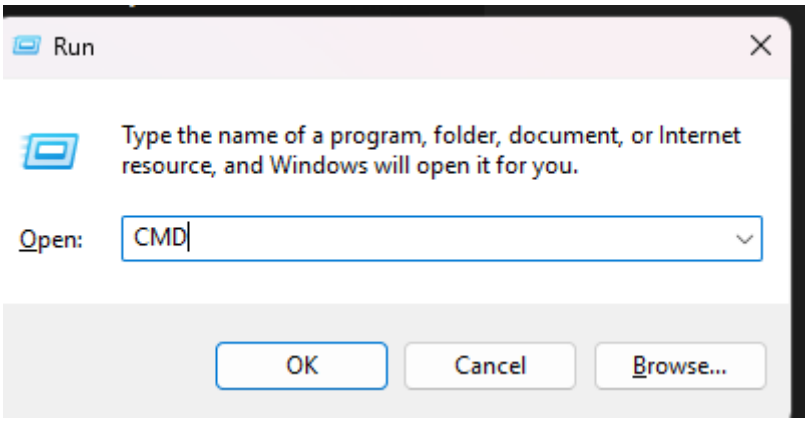
f) If you leave the classroom for a while and you leave your laptop behind, it is wise to lock the screen. Your Apps will continue to run in the background. So, for example, if you're waiting for a download that takes a while, lock the screen and get a cup of coffee. Which key combination do you use for this?

I used: Win + L

g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.

Win + R:

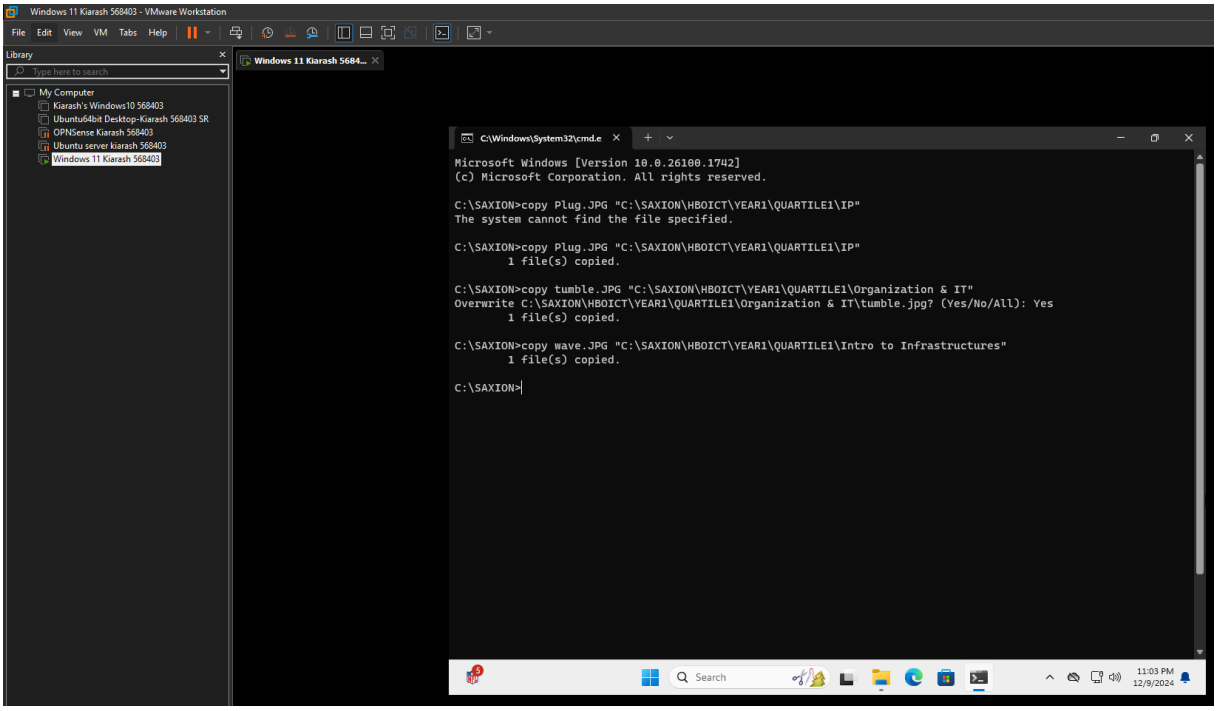




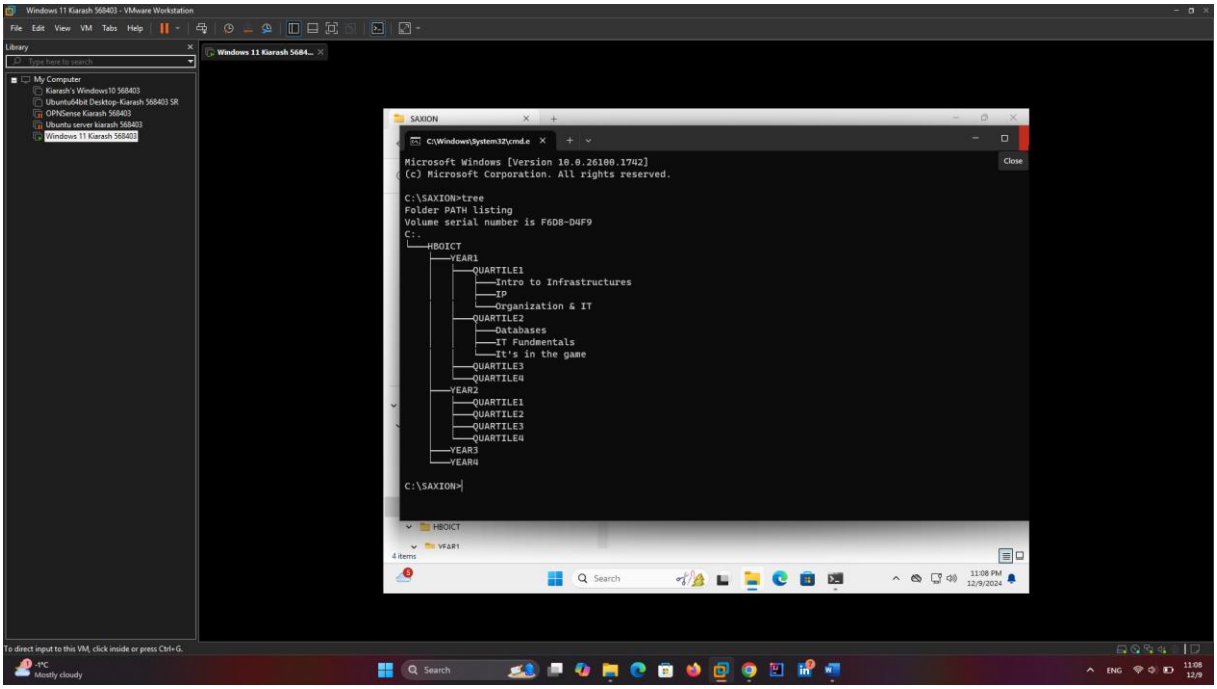
Working in the File Explorer

Relevant screenshots **copy** command:

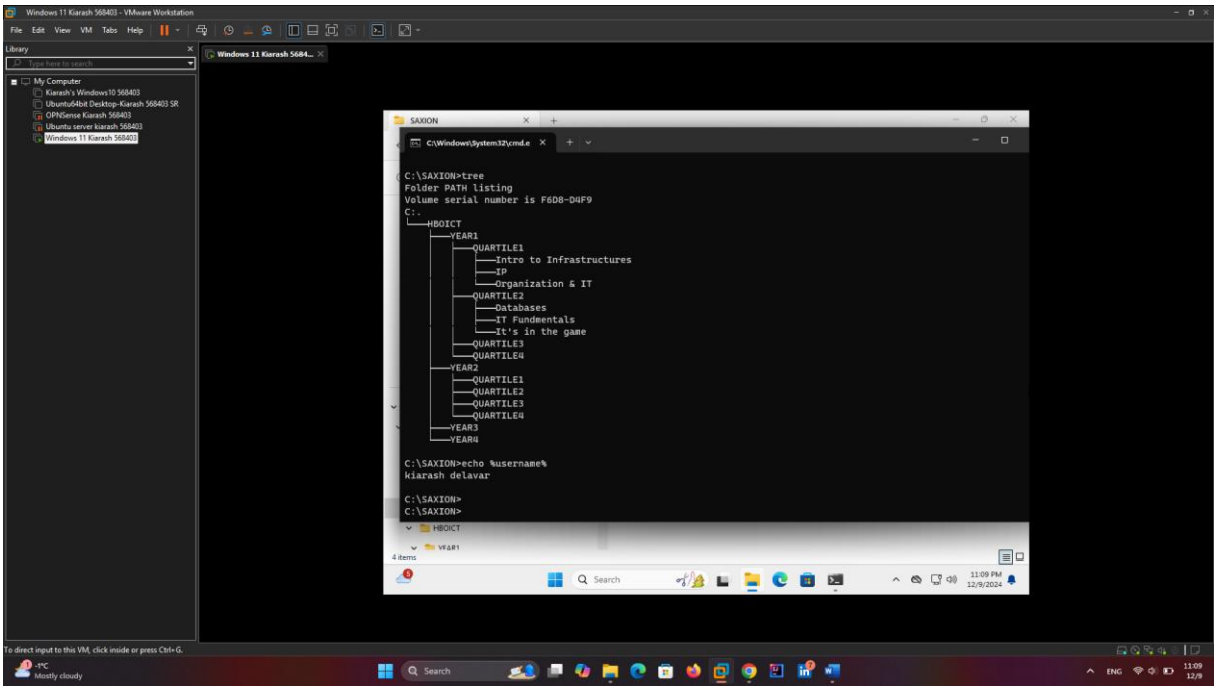
This is the whole copy commands for whole images:



Relevant screenshots **tree** command:

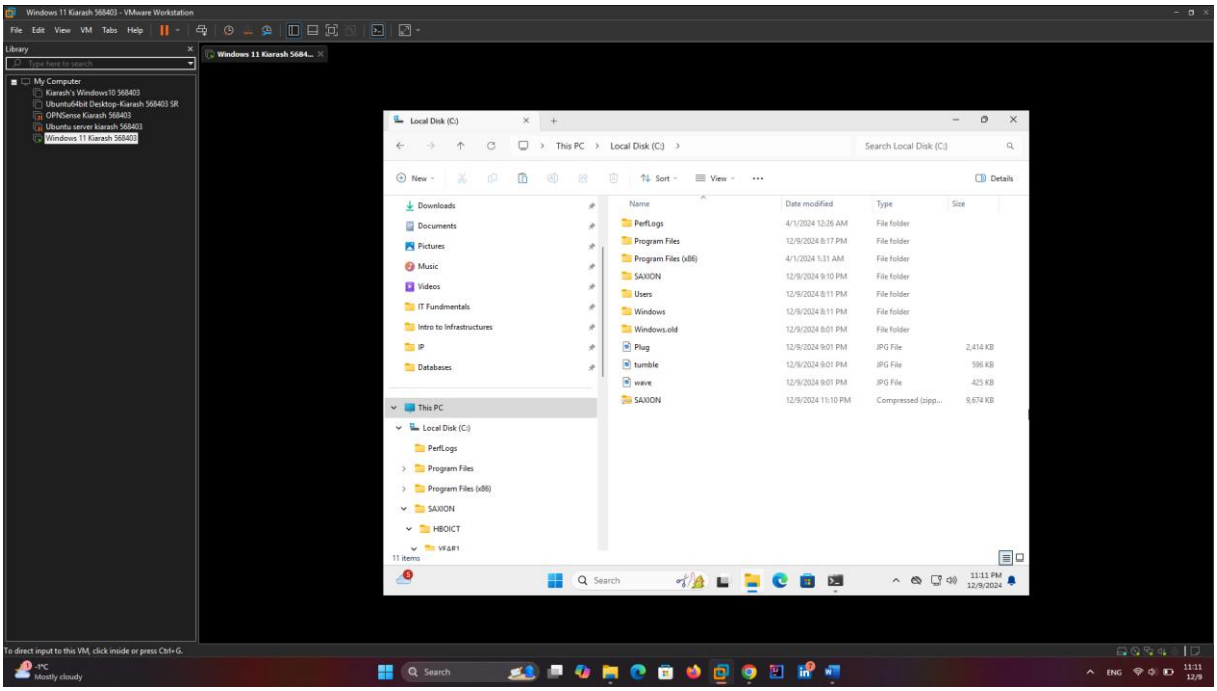


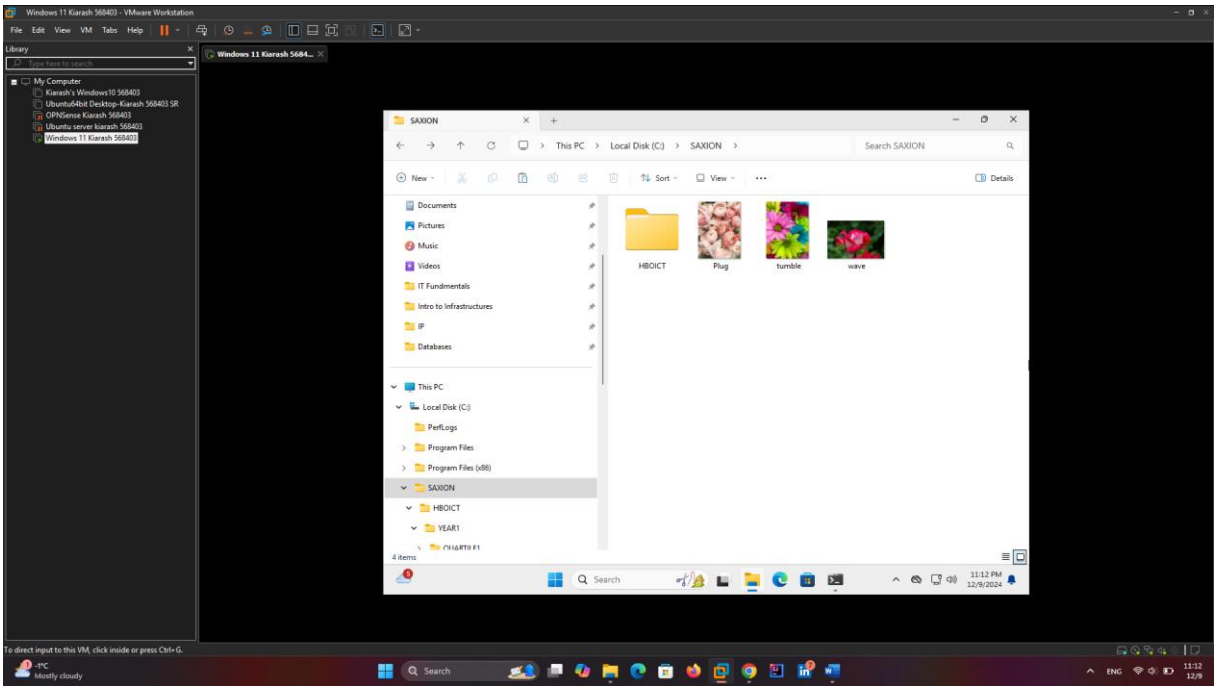
With my Username:

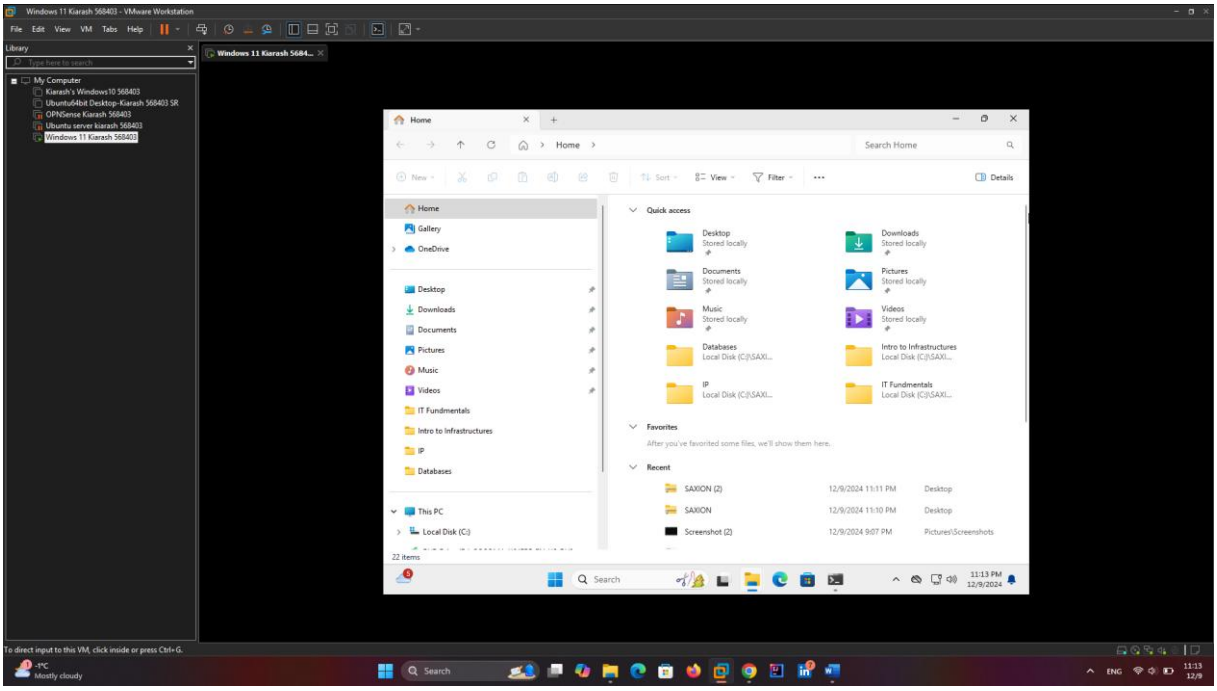


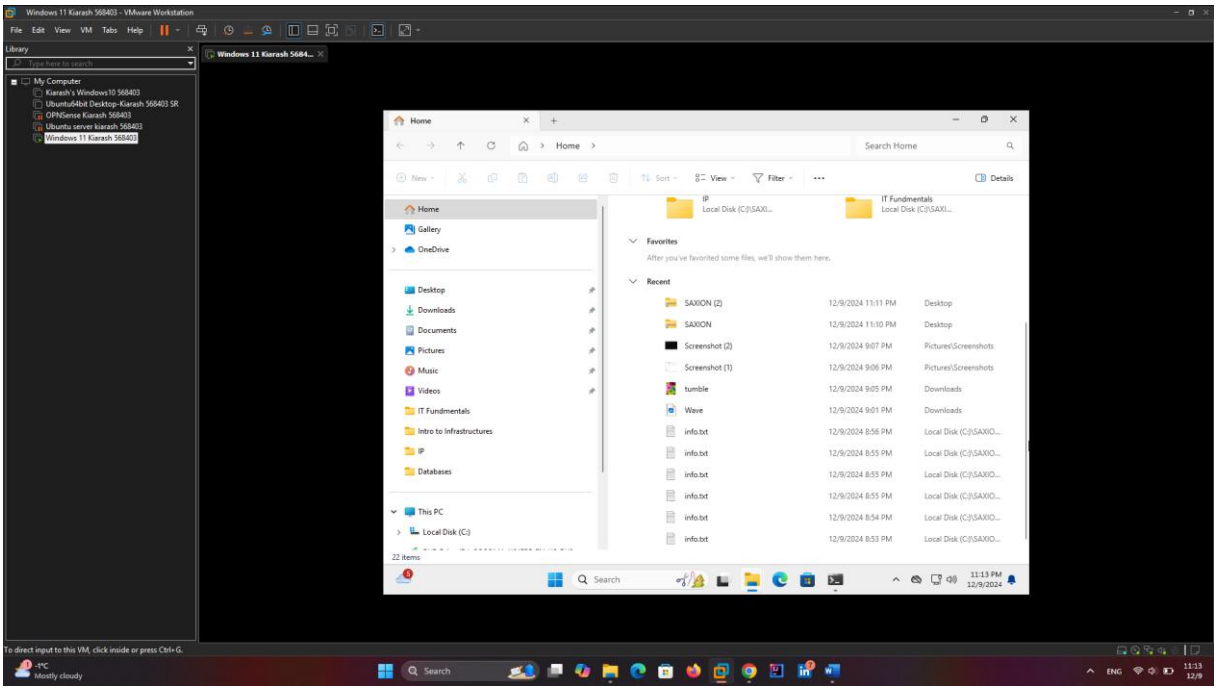
Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file:

The created zip file is located at the end of Local file (c:):




Windows 11 Kiarash 568403 - VMware Workstation
SAXION
HBOICT
Plug
tumble
wave

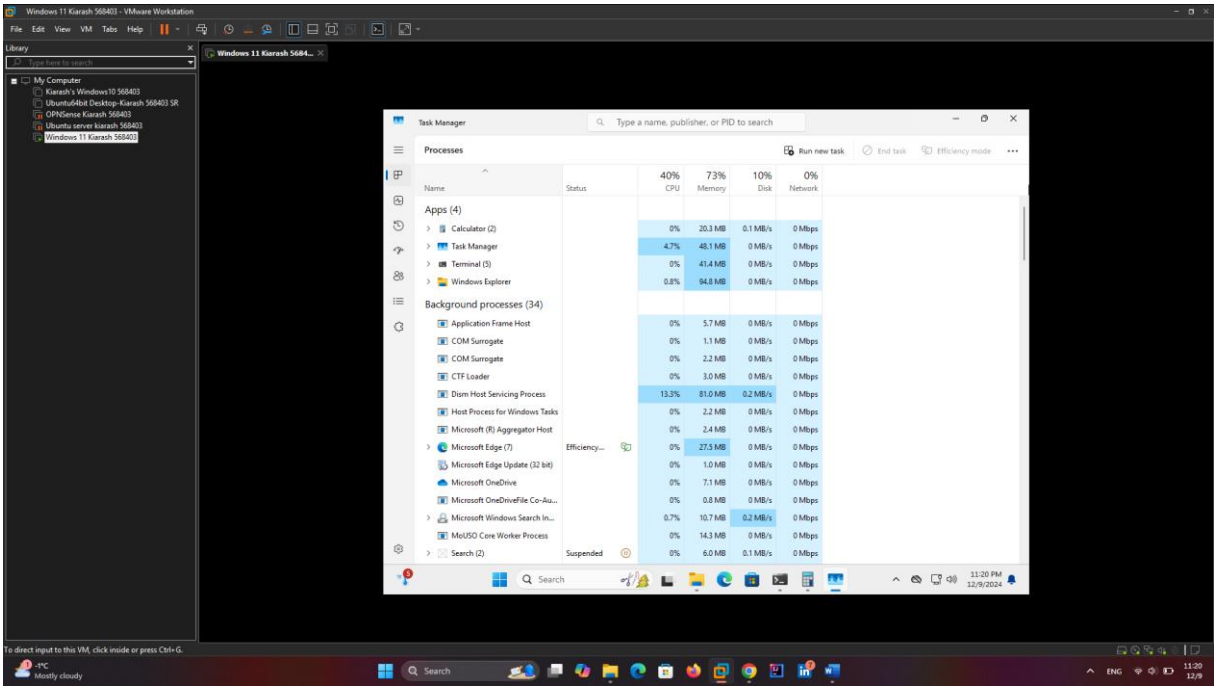

Windows 11 Kiarash 568403 - VMware Workstation
Home
Quick access
Desktop
Downloads
Documents
Pictures
Music
Videos
Favorites
Recent



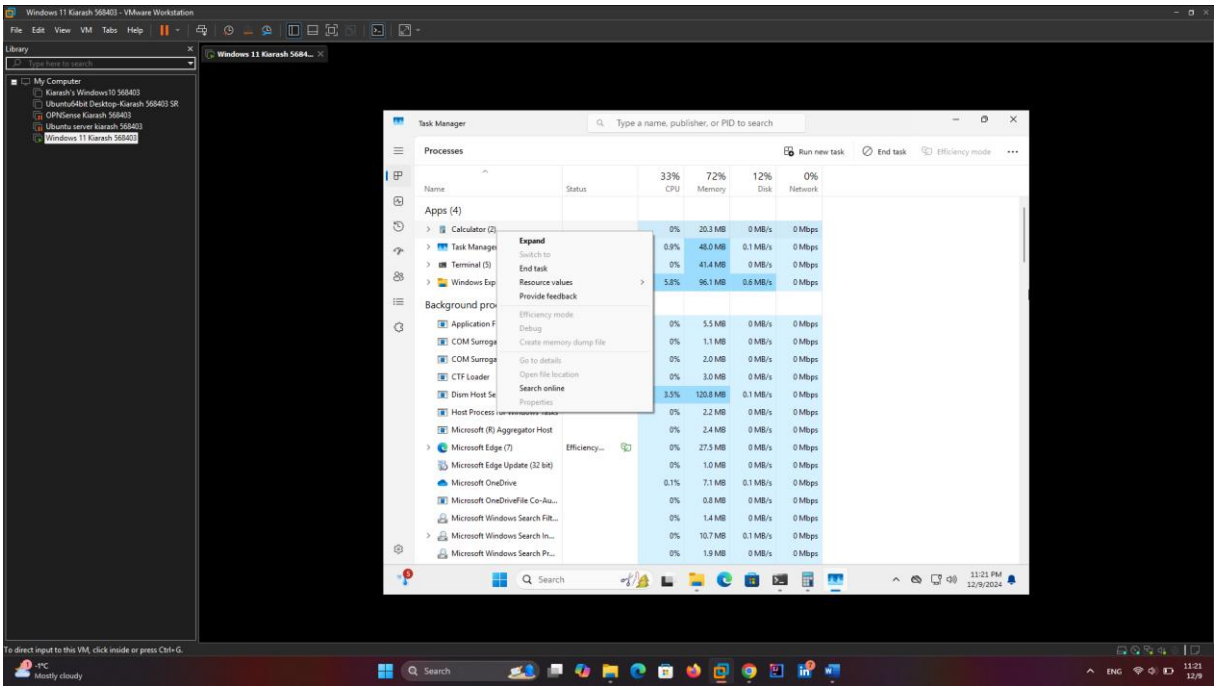
Terminating Processes

Relevant Screenshots Task Manager Window:

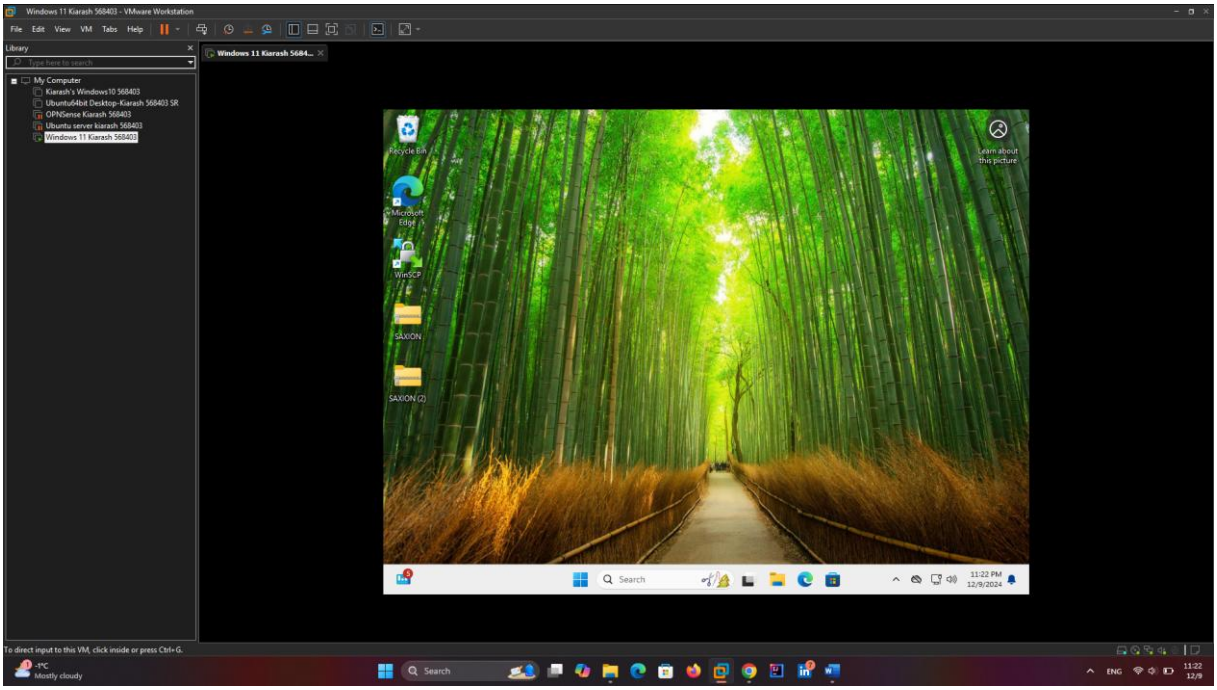
The Calculator:



End Task of Calculator:



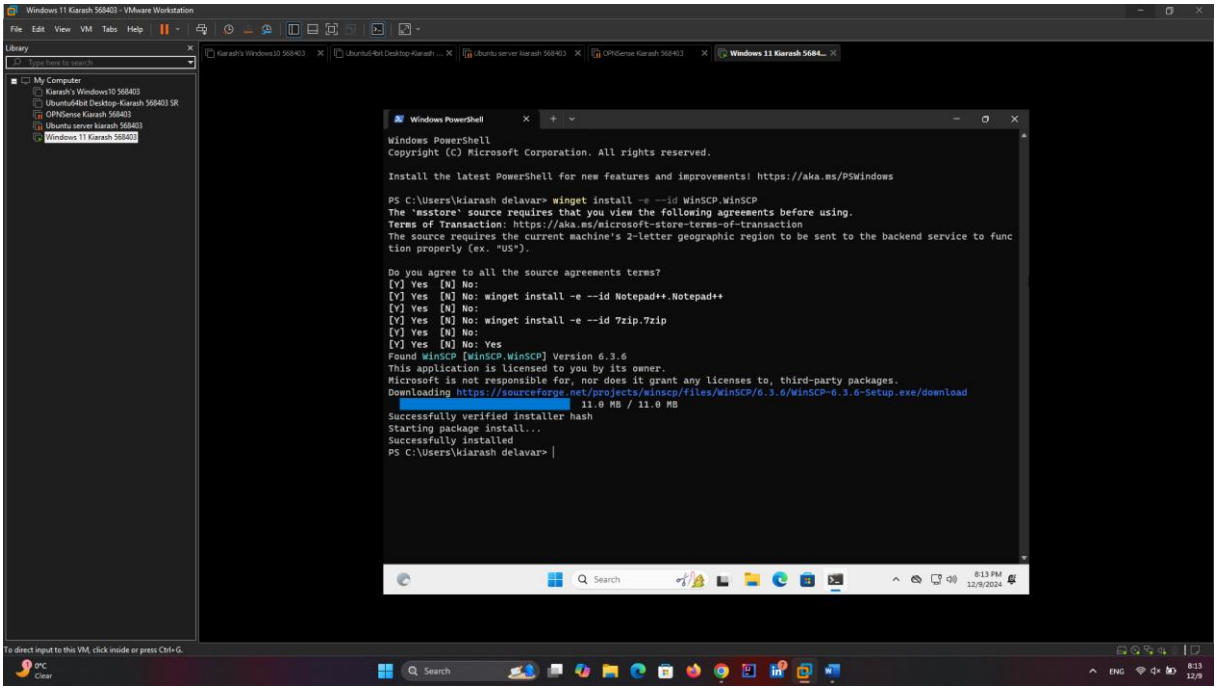
There is no Calculator:



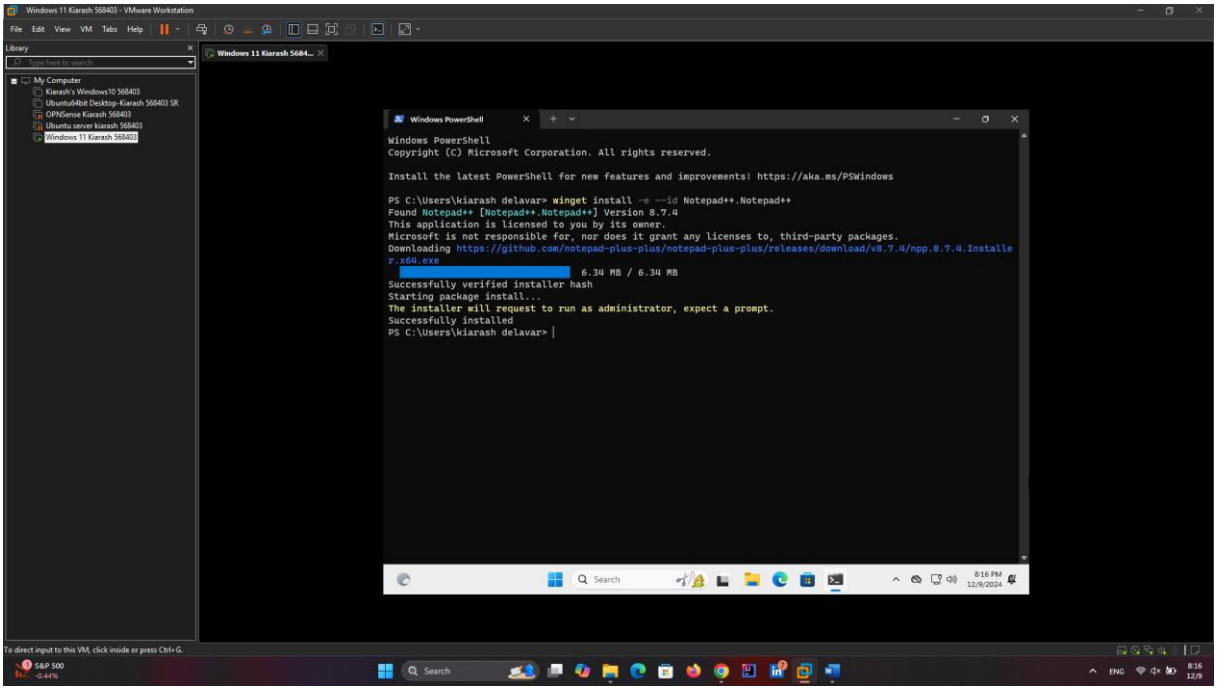
Install Software

Relevant screenshots that the following software is installed:

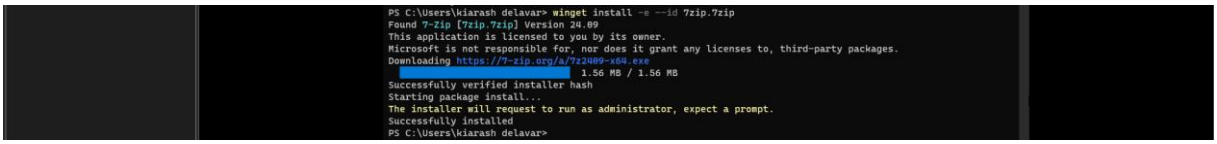
- **WinSCP:**



- **Notepad++:**



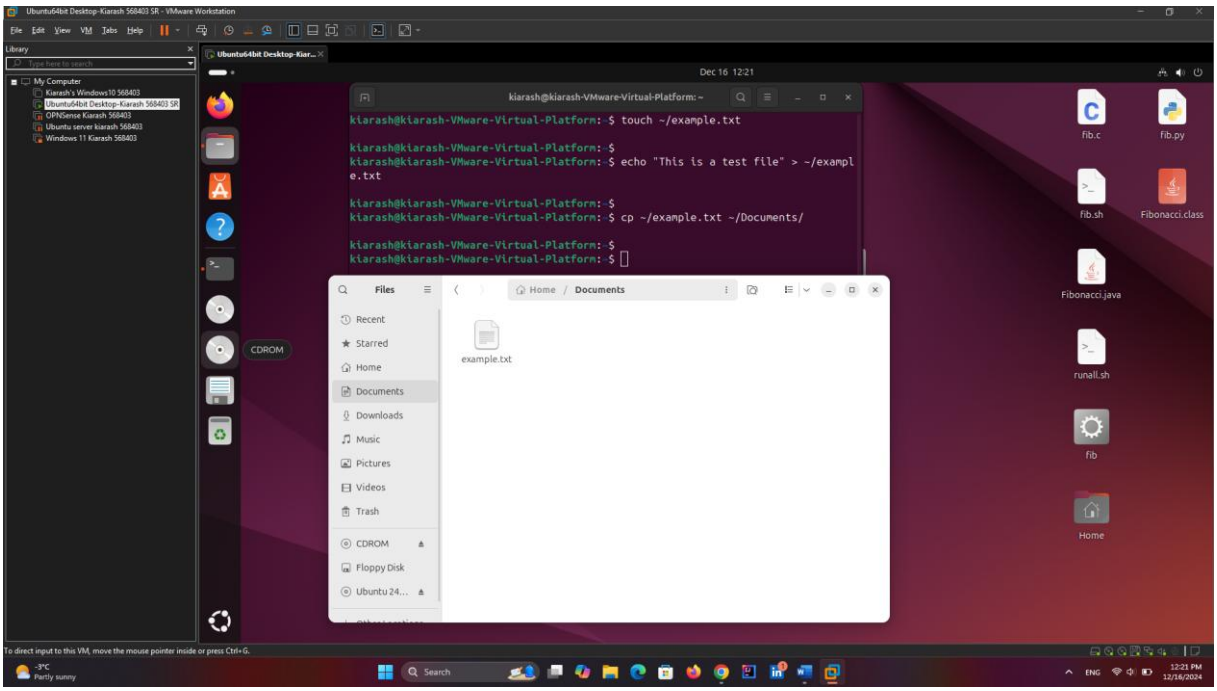
- **7zip:**


PS C:\Users\kiarash delavar> winget install -e --id 7zip.7zip
Found 7-Zip [7zip.7zip] Version 24.09
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://7-zip.org/a/7z2409-x64.exe
1.56 MB / 1.56 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator, expect a prompt.
Successfully installed
PS C:\Users\kiarash delavar>

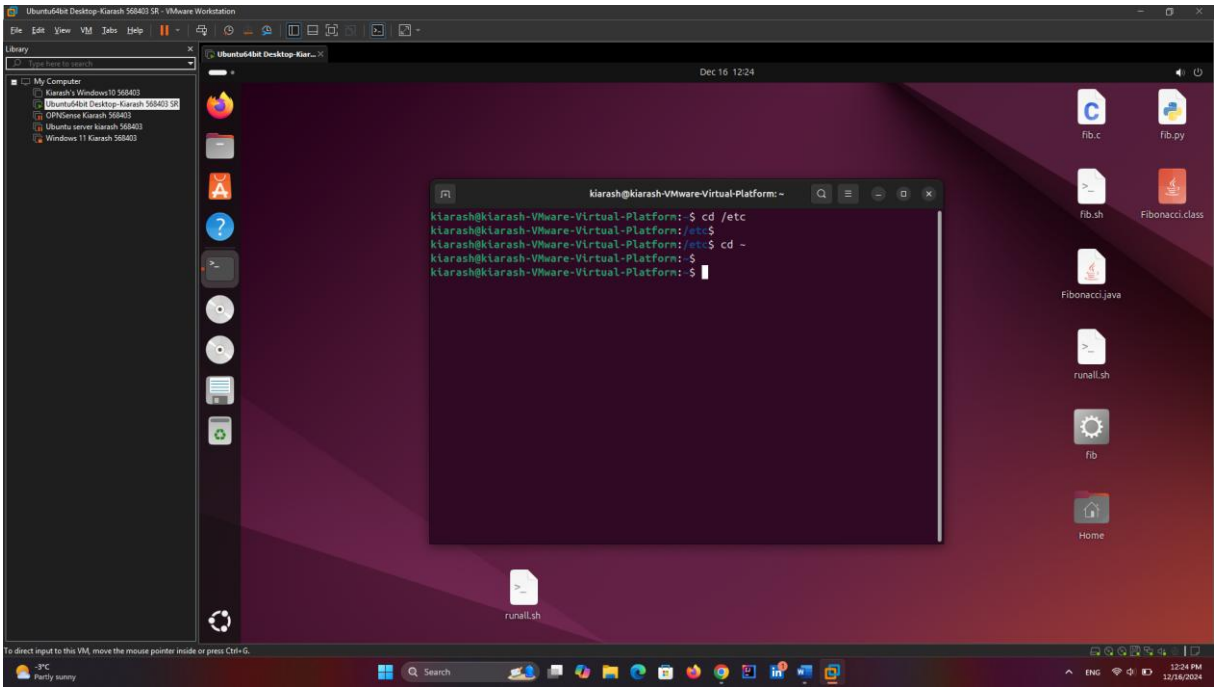
Assignment 5.4: Working with Linux

Relevant screenshots + motivation

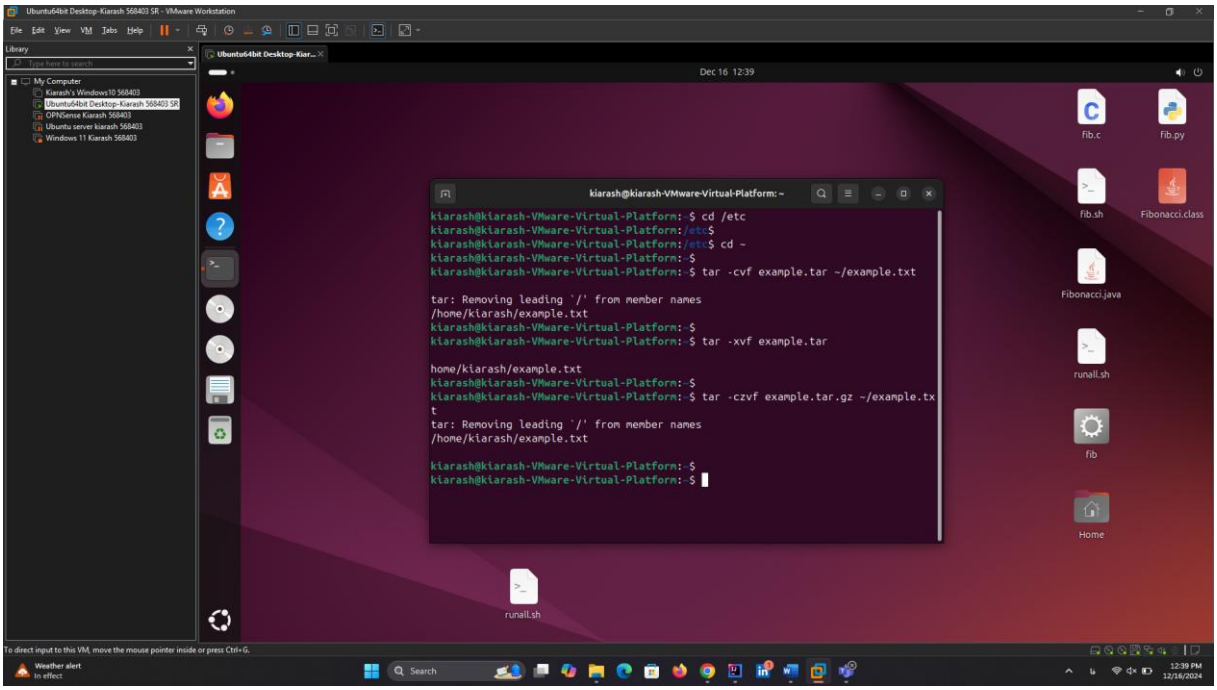
Copy files to " Document ":



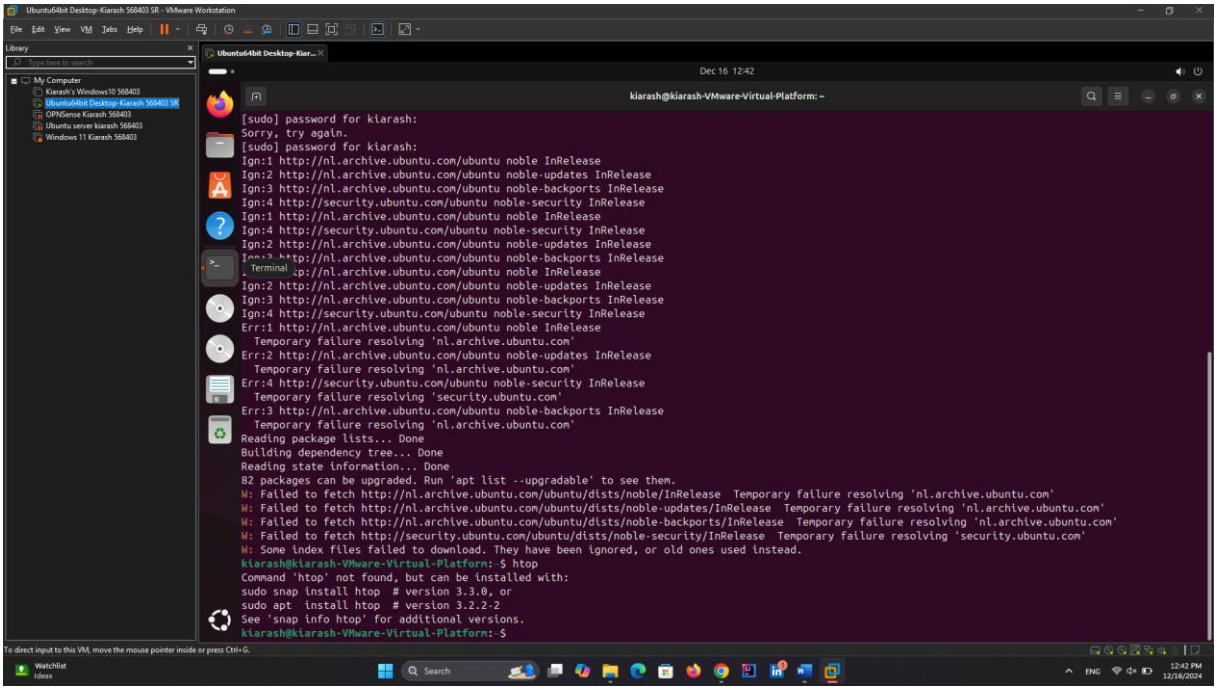
Navigating the File Structure:



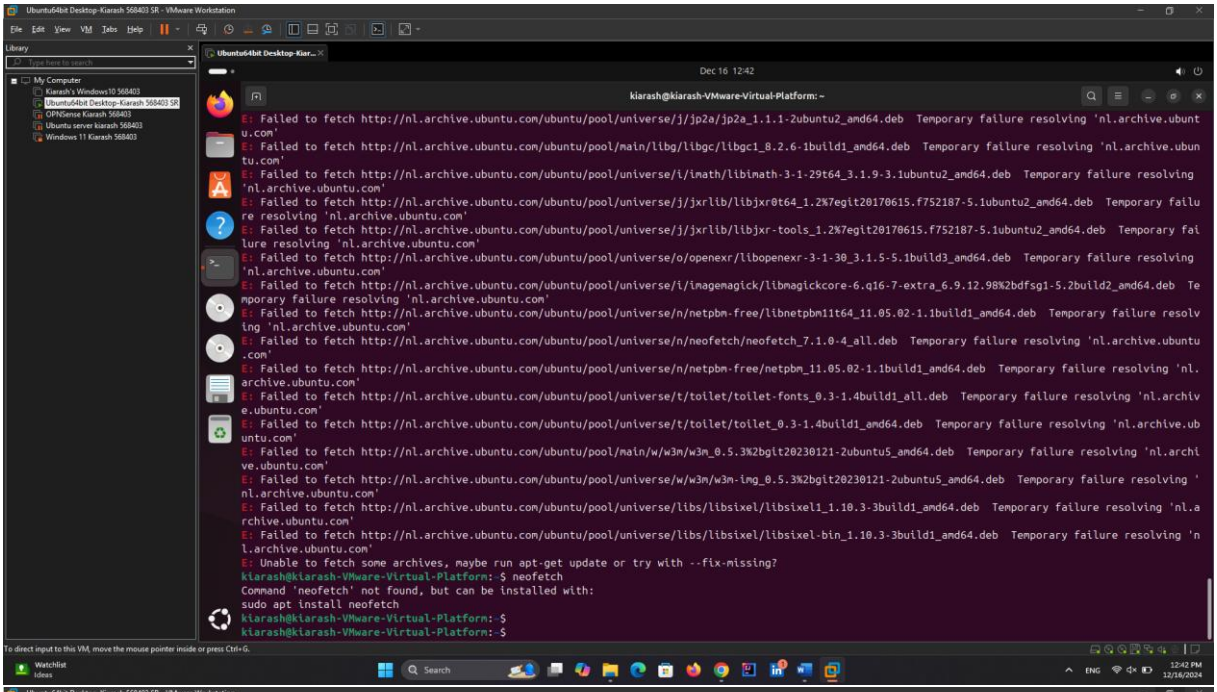
Compress files:

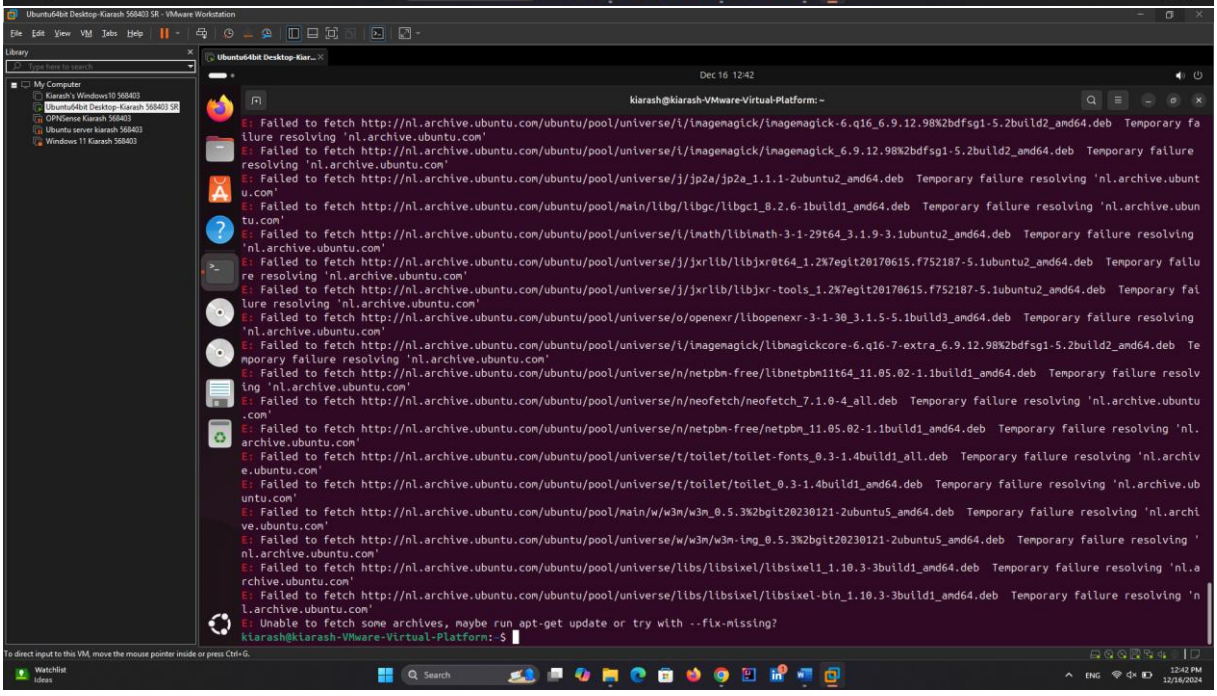


View Processes:



Install Software:

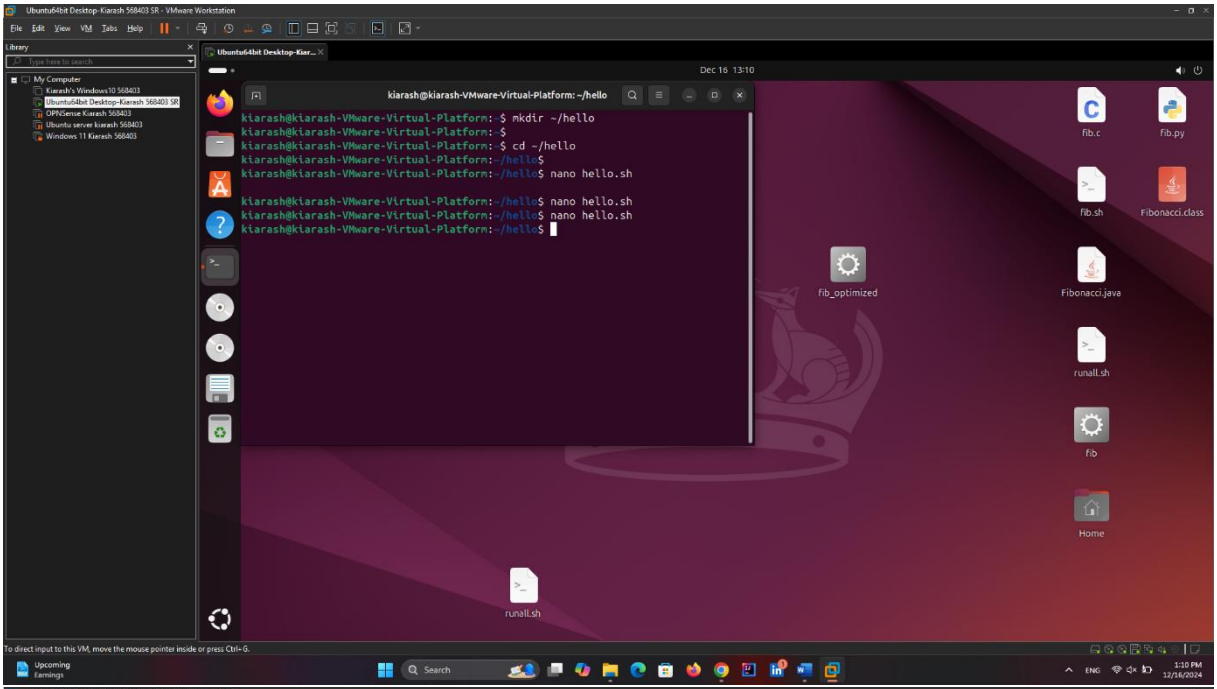


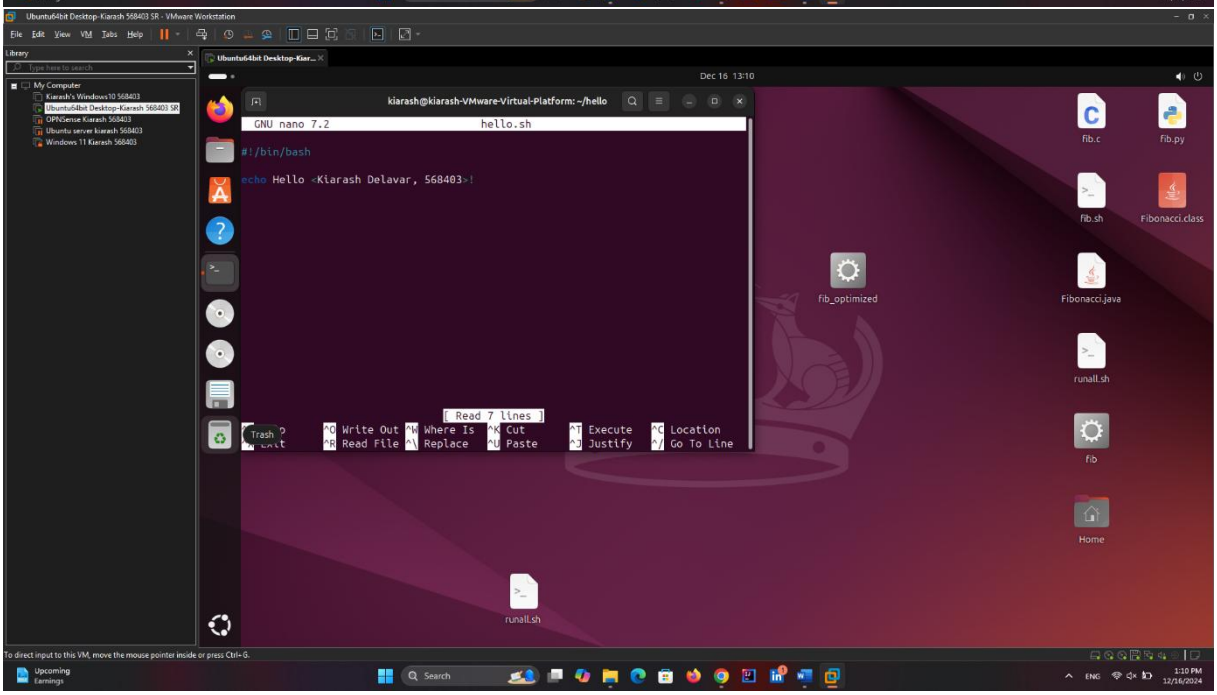


Assignment 5.5: Users and permissions on Linux

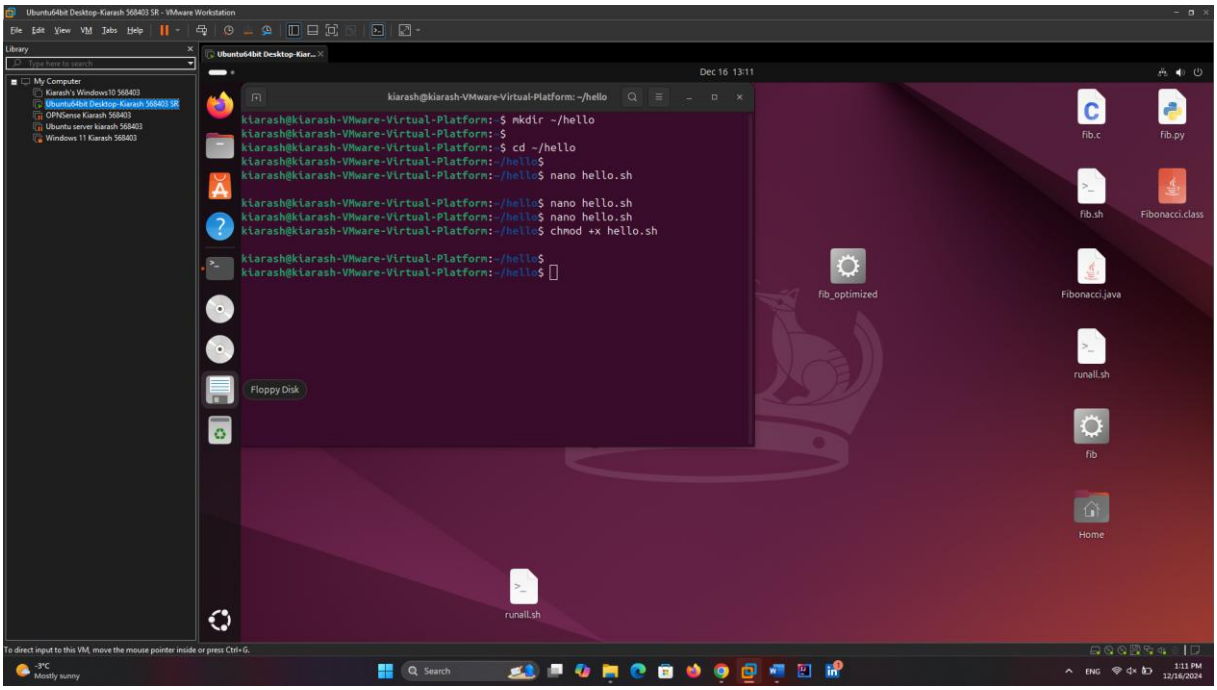
Relevant screenshots + motivation

Create a Script File:





Make the Script Executable:



Run the Script:

Assignment 5.6: View the contents of files

Relevant screenshots + motivation

Assignment 5.7: Digital forensics

Relevant screenshots + motivation

Assignment 5.8: Steganography

Relevant screenshots + motivation

Bonus point assignment – week 5

Make relevant screenshots + motivation:

- Proof that the FOG server is installed and is functioning correctly.
- Proof that the FOG server has made a back-up of the Windows11 VM or the Ubuntu 24.04 Desktop VM.

Ready? Save this file and export it as a pdf file with the name: **week5.pdf**